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A synopsis of the Telonychopodini, a tribe of Pantanalian chelodesmid millepeds (Polydesmida: Chelodesmidae)

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ABSTRACT

The tribe Telonychopodini is considered to contain three genera restricted to the southern part of the Brazilian state of Mato Grosso: *Telonychopus* Verhoeff, 1951, with two species (*meyeri* Verhoeff and *klossae* Hoffman); *Manfrediodesmus* Schubart, 1949, with the single species *passarellii* (Schubart), and the new genus *Pantanalodesmus,* based on *P. marinezae,* new species from the vicinity of Poconé, Mato Grosso. Keys are provided for all taxa; male genitalia are illustrated.

INTRODUCTION

In 1899, the German naturalist Hermann Meyer collected a large colorful milleped in a swamp along the Rio Cubiabá at Acorizal, Mato Grosso, the first step in an interesting sequence leading to the disclosure of a group of such species, centered on the Pantanal region around Cuiabá.

Eventually Meyer's specimen found its way, along pathways unknown to me, into the hands of Karl W. Verhoeff who perceived it to be ". . .*eine neue, aberrante Form der Rhachidesmidae*" – so aberrant that under the name *Telonychopus meyeri* the species became the basonym for a new family of rhacodesmoids, the Telonychopidae. This conception was based on the apparent absence of the moveable coxal structure [*cannula*], that is present in 99% of known polydesmidans. To Verhoeff, thinking in terms of isolated key characters, such an absence must

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mandate a relationship with the Middle American family Rhacodesmidae, long known and characterized largely by absence of the cannula. On the basis of this single observation, Verhoeff allied the Telonychopidae in a superfamily Rhachidesmidea along with the Rhachidesmidae [*sic*!] and Atopogonidae (one genus and species on New Caldedonia), and proceeded to discuss the situation in a long speculative essay.

Three critical issues were not confronted by Verhoeff. If the lack of a cannula was indeed a shared, derived character, why did the three groups have so little in common structurally otherwise; was the absence of the cannula simply a case of unrelated, independent loss; and why would such a association have absolutely no biogeographic precedent or known parallels?

The *denouement* to this situation came about as follows: being suspicious of Verhoeff's reasoning, I obtained in 1962 the microscope preparation of the *T. meyeri* gonopods and could not see how they differed substantially from the normal chelodesmid type. Because of their large size, however, Verhoeff had separated the coxae and telopodites in order for them to fit under the cover glass of the preparation, inflicting some damage during this process.

A year later, in 1963, Dr. Gertrud Rita Kloss, working on the nematode parasites of Brazilian millepeds, collected several large chelodesmids from western Mato Grosso and, after their autopsy, sent them to me for identification. The riddle was then solved instantly: the gonopods matched those of *meyeri* very closely, except that in their intact condition, a perfectly normal cannula was present in the usual location. In all peripheral characters, this species (which was named *Telonychopus klossae*) also agreed with the chelodesmid norm. So much for the family Telonychopidae: a fantasy based on a defective specimen. In writing this information up in my 1965 paper, I gave the same historical account as that stated above, and found the most exalted status I could justify for this genus was that of a tribe endemic to the interior of South America, embracing also the genera *Catharodesmus, Manfrediodesmus,* and *Euthydesmus.* In my 1980 *Classification,* I mongrelized this tribe by adding four additional (and, as I now know, misplaced) genera, which require placement in other taxa.

Within the past year, however, the case has been re-opened by the discovery near Cuibá of a related, undescribed, chelodesmoid. Sent to me for identification by Prof. Dr. Joachim Adis (Plön), this new material catalyzed an examination of the generic limits of *Telonychopus* and the results of that inquiry are set forth in the following pages. It is hoped that this initiative will be useful to Brazilian scientists working with the fauna of the Pantanal region, and will lead to a better knowledge of the diversity of its millepeds.

Family CHELODESMIDAE Cook

Tribe Telonychopodini Verhoeff

Telonychopidae Verhoeff, 1951, Zool. Anz., 146: 82.
Telonychopodini Hoffman, 1965, Pap. Avuls. Zool. 17: 252; 1980, Classification of the Diplopoda, p. 151.

Large chelodesmids, body length to 70 mm; paranota set high on sides, both corners rounded on segments as far back as midbody, acutely produced only on last four or five segments; ozopores in normal sequence, placed in flat peritremes continuous with segmental margins; metaterga essentially smooth to microcoriarious, with shallow transverse sulcus, no rows of tubercles; stricture deep, anterior edge sharply defined, prozonal surface coarsely reticulate; limbus with large spine-like projections ventrally. Gonopods with large median sternal element, coxae massive, surrounding base of telopodites, much of their mass carried *outside* the sternal aperture; sternal apodemes large, flat, and decurved at 90° angle to coxal axis; telopodites set on coxae at a right angle, usually straight and massive, without or with only rudimentary prefemoral process; no trace of torsion, prostatic groove visible for its entire length on mesal side. Males with low paramedian setose knobs on anterior sterna; sternum of 6th segment deeply excavate; legs without any modification. Cyphopods large and projecting ventrad outside the body, of the form shown in Figs. 12 and 13, receptacle sclerite apparently absent.

As presented in my 1980 classification, this tribe was quite heterogeneous with the eight genera assigned to it. A more stringent concept now excludes all of them except *Telonychopus, Manfrediodesmus,* and the new genus here described. The species of the tribe are closely similar in external features, and even the genera may not be recognized without reference to gonopod structure. Nonetheless, the latter is so diverse that annectant conditions are now difficult to postulate.

To a greater extent than in many chelodesmids, species of this tribe combine an elaborate mix of generalized and derived characters. Plesiomorphic states are manifested, e.g., in the lack of secondary sexual modifications in male sterna and legs, and the retention of prominent median gonosternal sclerites. Specializations occur as greatly enlarged gonopod coxae, the presence of spiniform projections on the limbus, and the hypertrophied form of the cyphopods.

General overall body form and the modified limbus suggest relationship with other taxa of the Parana drainage basin such as *Leiodesmus* and some satellite genera. Cyphopod structure is similar to that in the species of Macrocoxodesmini, but the valves face mesad rather than laterad.

KEY TO GENERA OF TELONYCHOPIDAE

1. Telopodite of gonopod with an accessory subterminal process on dorsal side (Fig. 6, AP); prostatic groove carried distally on the telopodite along a lateral crest (Fig. 5, X) and visible in ventral aspect . . . . . ***Manfrediodesmus***
– Telopodite of gonopod with only two apical processes; prostatic groove confined to medial surface of telopodite and invisible in ventral aspect 2

2. Telopodite of gonopod, as seen in mesal aspect, distinctly curved dorsad, in ventral aspect, broadly conchoidal in form (Fig. 11); solenomere slender, sigmoidally curved (Fig. 12, S) . . . . . ***Pantanalodesmus***
– Telopodite nearly straight as seen in mesal aspect, more nearly cylindrical in form (Fig. 2); solenomere short, laminate, falcate . . . . . ***Telonychopus***

Genus ***Telonychopus*** Verhoeff

Telonychopus Verhoeff, 1951, Zool. Anz., 146: 86. Monotypic with a new species. Type species, *T. meyeri* Verhoeff. — Hoffman, 1965, Pap. Avuls. Zool., 17: 282.

DIAGNOSIS: With the characters of the tribe, differing from the other two genera as specified in the foregoing key, the gonocoxa is also proportionately much smaller in respect to length of the telopodite.

Remarks: Although the two taxa admitted to the genus can be distinguished without difficulty, the possibility may not be excluded, that they represent elements of a single polytypic species. Their relationship can be clarified when material from additional localities around Cuiabá is available for comparison.

KEY TO SPECIES OF TELONYCHOPUS

Telopodite of gonopod relatively stout, solenomere without triangular basal lobe on lateral side (Fig. 1) . . . . . *meyeri*
Telopodite of gonopod relatively slender, solenomere with triangular basal lobe on lateral side (Fig. 2, L) . . . . . *klossae*

Telonychopus meyeri Verhoeff

Figure 1

Telonychopus meyeri Verhoeff, 1951, Zool. Anz., 146: 87, figs. 1-5. Holotype (gonopods only) (ZSBS) from Acorizal, Mato Grosso, H. Meyer leg. 23 April 1899. – Hoffman, 1965, Pap. Avuls. Zool., 17: 244, fig. 1.

MATERIAL: Gonopod preparation of holotype; location of body, if still extant, unknown.

DISTRIBUTION: Known so far only from the type locality.

Telonychopus klossae Hoffman

Figures 2-3, 15

Telonychopus klossae Hoffman, 1965, Pap. Avuls. Zool., 17: 246, figs. 2-7. Male holotype (MZUSP) from Santo Antonio Leverger, Mato Grosso, Brasil, M. Alvarenga et al. leg. 26 November 1963.

MATERIAL: Male and female paratypes (VMNH) from Chapada dos Guimarães, Mato Grosso, 11-14 November 1963, leg. Alvarenga, Oliveira, and Bokermann.

REMARKS: The original description of this species, and illustrations of the male characters, are very detailed; the cyphopods however received scant attention. I take this opportunity to provide illustrations of these structures. Generally similar to those of *Pantanalodesmus marinezae*, the cyphopods of *klossae* are relatively more robust with prominent valvular dentations (cf. Figs. 14 and 15).

DISTRIBUTION: Beside the two original localities, the species is known from the University of Cuiabá campus, under *Cocos nucifera*, M. I. Marques leg. 15 January 1999 (Univ. Cuiabá, 1♂, S. I. Golovatch det.)

Genus ***Manfrediodesmus*** Schubart

Manfredia Schubart, 1943, Pap. Avuls. Zool. 3: 140. Monobasic with a new species. Type species: *M. passarellii,* by original designation. Preoccupied by *Manfredia* Verhoeff, 1940.

Manfrediodesmus Schubart, 1949, Rev. Brasileira Biol.., 9: 18 (new name for *Manfredia* Schubart, 1943, *ipso facto* with the same type species).

DIAGNOSIS: With the characters of the tribe, distinguished by the more elaborate structure of the gonotelopodite, particularly the tripartite distal end and the location of the solenomere on a distinct ventrolateral flange for most of its length (Fig. 5).

DISTRIBUTION:This monotypic genus is known only from the southwestern part of Mato Grosso, Brazil.

Manfrediodesmus passarellii (Schubart)

Figures 4-6

Manfredia passarellii Schubart, 1943, Pap. Avuls. Dept. Zool. São Paulo, 3:140, figs. 2, 3. Holotype male, MZUSP, from São Luiz do Cáceres, Mato Grosso, E. Garbe leg., October 1917.

Manfrediodesmus passarellii: Schubart, 1949, Rev. Brasil. Biol., 9: 18; 1958.

MATERIAL: Male holotype and topoparatype (MZUSP) examined.

COMMENT: The more proximal of the telopodite processes is set off from the two distalmost by a distinct depression on both mesal and lateral sides (Fig. 4) which is perhaps a precursor of a cingulum.

Pantanalodesmus, new genus

TYPE SPECIES: *P. marinezae,* new species.

NAME: A neologism derived from the Pantanal region of Brazil + the combining form *-desmus,* widely used in this order..

DIAGNOSIS: With the characteristics of the tribe,

DISTRIBUTION: Known so far only from the locality of the single species.

Pantanalodesmus marinezae, new species

Figures 7-14

MATERIAL: Male holotype and female paratype (MZUSP, São Paulo), two male and two female paratypes (Univ. Cuiabá), one pair of male and female paratypes in VMNH (Martinsville), MNHG (Genève), FMNH (Chicago), MPEG (Belém), INPA (Manaus), Zool. Mus. Moscow, Coll. Adis (Plön), from Fazenda Ipiranga, km 10 on the Transpantanal Highway near Poconé, Mato Grosso, Brasil; J. Adis et al. leg. 20 October 1998.

NAME: For Prof. Dr. Marinêz I.Marques, Universidade de Cuiabá, in recognition of her contributions to knowledge of the fauna of the Pantanal region.

DIAGNOSIS: Differing from other members of the tribe in the relatively short, broad, subconchoidal, dorsally curved telopodite and sinuously curved solenomere.

HOLOTYPE: Adult male, length ca. 68 mm., body broadest near anterior end, thence parallel-sided for most of length, gradually narrowed over last four segments; width of segment 2, 10.8 mm, segment 6, 12.1 mm, segment 10, 11.5 mm, segment 14, 11.2 mm, segment 16, 10.8 mm, segment 18, 7.3 mm. W/L ratio at midbody, 17%.

Head, antennae, paraprocts, prozona and stricture deep mahogany-red dorsally, shading into lighter brown ventrally; metaterga light orange-brown, lateral edges of paranota and a broad lunate band on caudal margin nearly yellow. Sides of metazona, sterna, and basal podomeres light yellowish-brown, the legs darker distally.

Prozona rather coarsely textured with isodiametric mesh; stricture deep and prominent, the anterior edge sharply defined; metaterga very finely microcoriarious. with shallow transverse sulcus, but no rows of tubercles. Limbus broad, with smooth

edge dorsally, ventrolaterally and ventrally becoming prominently ciliate, the individual fimbriae originating slightly proximad of edge. Paranota large, set high on sides, continuing slope of dorsum; W/H ratio at midbody *ca.* 70%. Paranota of segments 2-4 directed cephaloventrad, of 5-15 basically transverse, both anterior and posterior corners evenly rounded back to about 11th, thereafter gradually more angular to acutely produced by segment 16. Scapuloral rim marginal, abruptly expanded at posterior corner of poriferous segments into oval peritreme (Fig. 9), pores in normal sequence. Posterior segments of normal chelodesmoid configuration, epiproct acute; paraprocts with moderate depression setting off edges; hypoproct with prominent median projection and indistinct paramedian tubercles.

Sides of metazona finely and evenly granulate, with low rounded knob above base of each anterior leg. Legs attached to elevated podosterna, each with deep transverse groove and emarginate posterior surface, small subcoxal knobs present on most segments. Sternal width at midbody 2.5 mm, surface sparsely setose. Legs as long as metazonal width (11.5 mm at midbody) and robust, sparsely setose basally, tarsi densely so.

Sterna of anterior segments narrow, coxae of 2nd pair in contact, 3rd nearly so, segment 4 with two small, contiguous, paramedian processes, segment 5 with two pairs in similar processes slightly more separated; segment 6 broad, deeply excavated to accomodate gonopodal apices, coxae of 6th and 7th legs elongated; legs of anterior segments densely setose ventrally. Podomeres without trace of sexual modification.

Segment 7 with exceptionally large, transverse gonopodal aperture consuming entire ventral surface of both pro- and metazonum, lateral ends elevated, anterior and posterior edges not raised. Gonopod coxae enormously enlarged, half of their mass held outside the aperture; a prominent, fully sclerotized median sternal element present (Fig.11), broadest on ventral side, abruptly narrowed dorsally; coxosternal apodeme very large, abruptly recurved. A large, densely setose coxal apophysis present above base of cannula; lateral surface with sparse smaller subapical setae. Base of telopodite largely enclosed within coxa, broadened prefemoral region concealed by coxal apophysis as in other members of the tribe, only a small digitiform prefemoral process evident.

Telopodite (Figs. 11-13) small relative to coxal size, broad, subconchoidal, curved dorsad, mesal face concave; prostatic groove visible for entire length in mesal aspect; solenomere slender, sigmoid, basally looped; opposed by broad, spatulate apex (?tarsus; "parasolenomere").

PARATYPE: Adult female, body length ca. 70 mm, body subparallel-sided at about 11 mm. from segment 3 to 14, thereafter gradually narrowed posteriad. Coloration and most peripheral features exactly as described for male except paranota smaller and legs distinctly more slender. Cyphopods very large, extended far beyond ventral edge of segment 3, of the form shown by Fig. 14.

COMMENTS: At the type locality, these millipeds were found beneath the decomposing leavess of *Scheelea phalerata* (Martius) (Arecaceae).

In addition to the type series personally examined, additional material is known (Adis, pers. comm.) from Mato Grosso: Fazenda Retiro Novo (Pirizal) near Poconé, G. Brizolla & M. I. Marques leg. 27 X 1999, in soil under *Scheelea phalerata* (1♂, 1♀, MZUSP).

ACKNOWLEDGEMENTS

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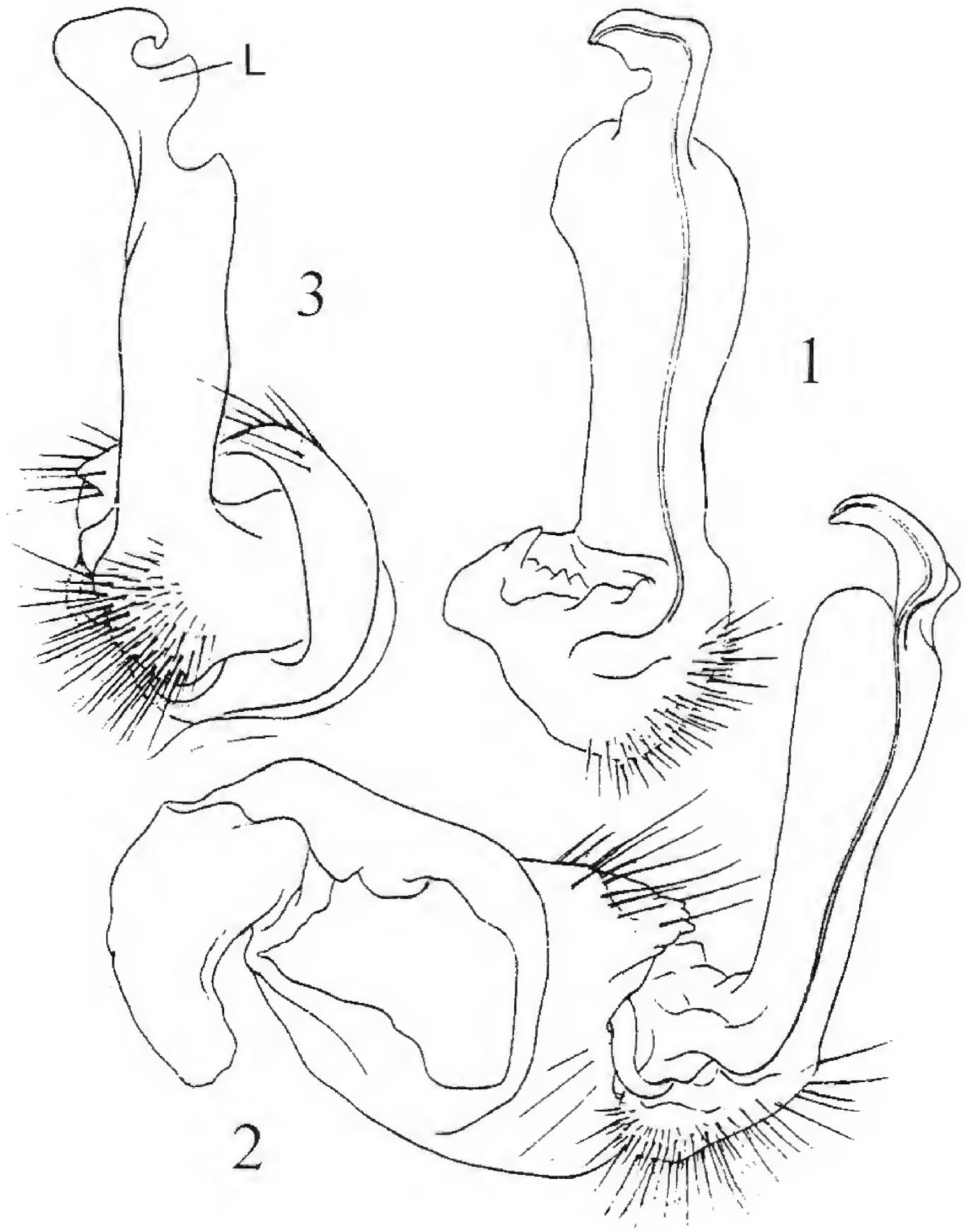
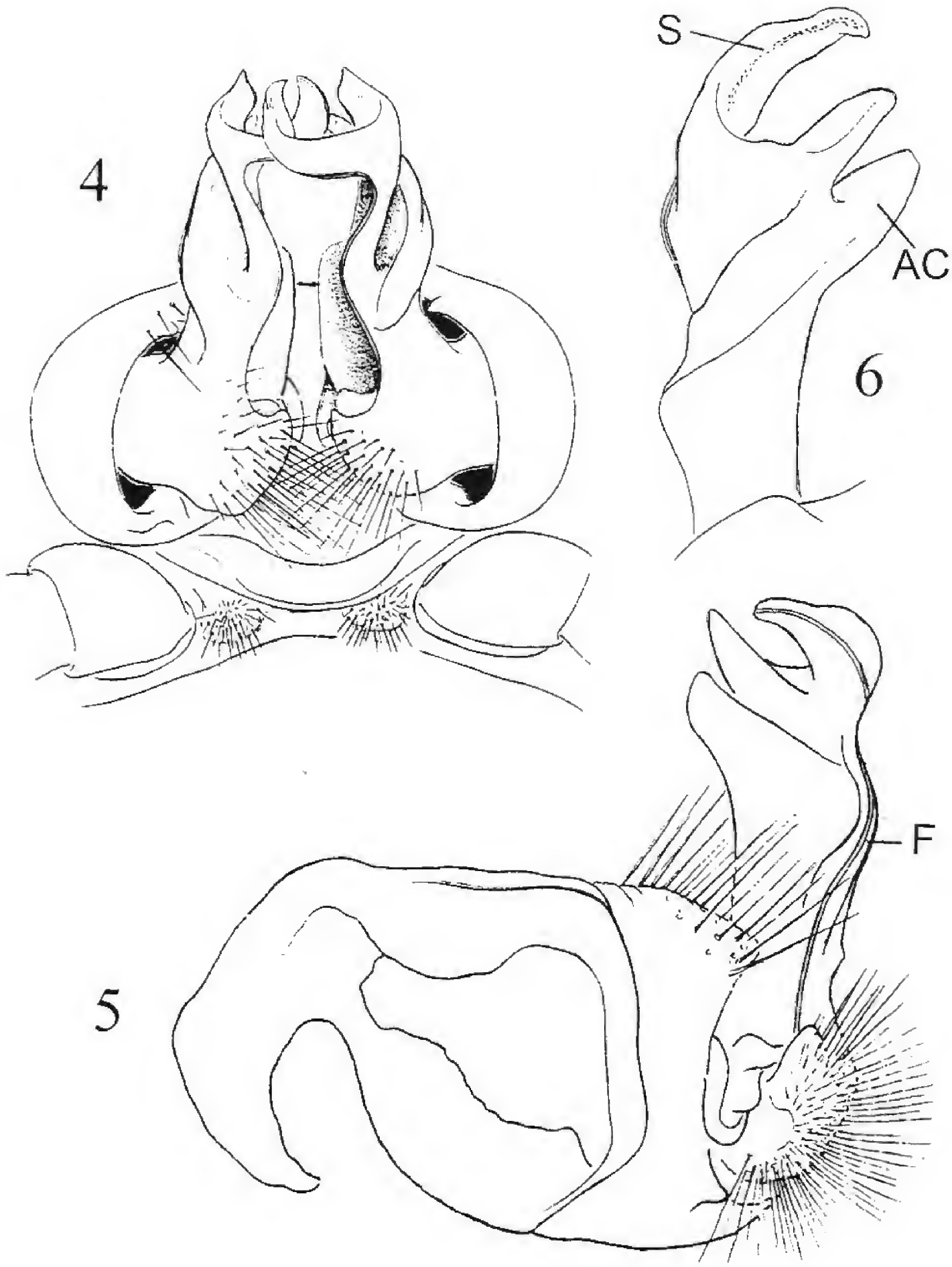
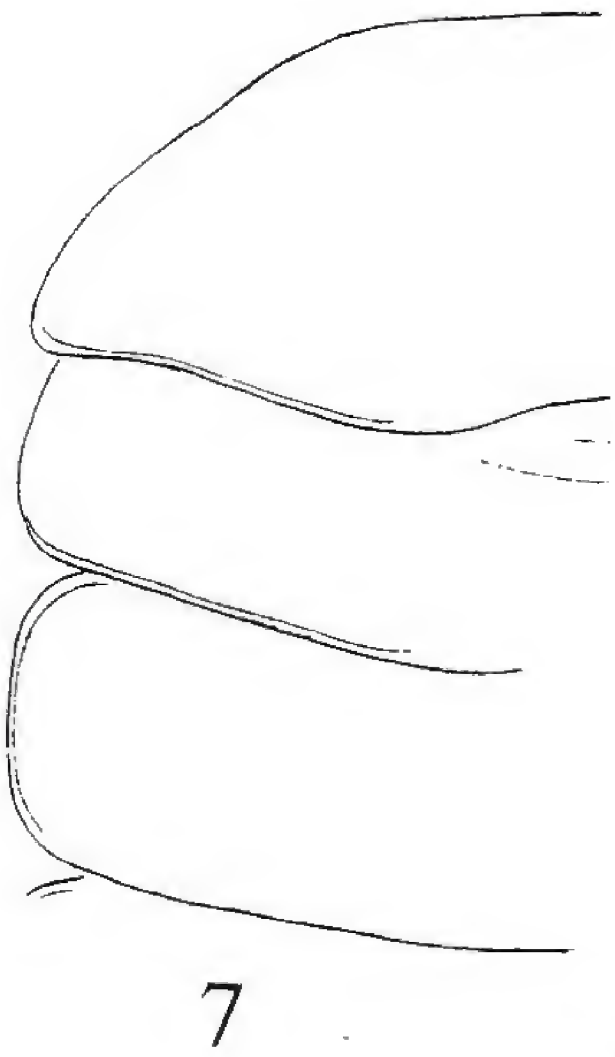


Figs. 1-3. Gonopods of telonychopodine species. 1. Telopodite of left gonopod of *Telonychopus meyeri* Verhoeff, mesal aspect. 2. Left gonopod of *Telonychopus klossae* Hoffman, mesal aspect, 3. The same gonopod, ventral aspect. Drawings from holotypes.



Figs. 4-5. *Manfrediodesmus passarellii* (Schubart). 4. Gonopods in situ, ventral aspect. 5. Left gonopod, mesal aspect. 6. Distal half of telopodite of left gonopod, lateral aspect. Abbreviations: s, solenomere; AC, accessory (?femoral) process; F, ventral flange with prostatic groove. Drawings from topoparatype (MZUSP).



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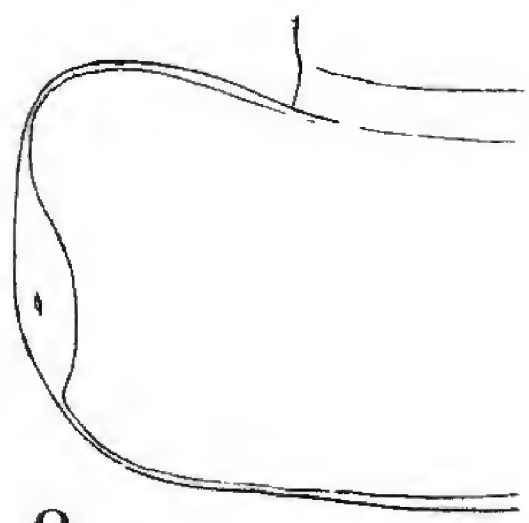

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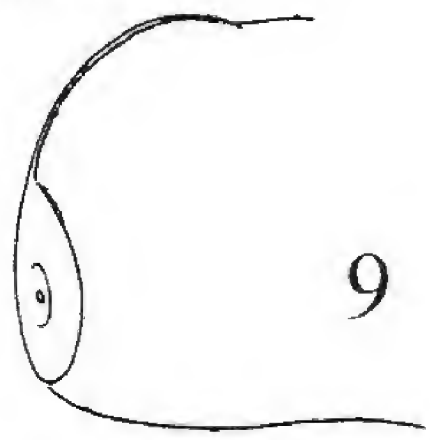

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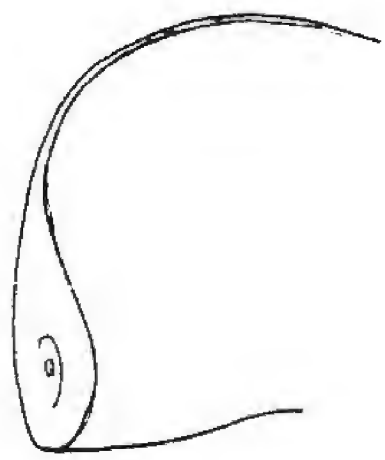

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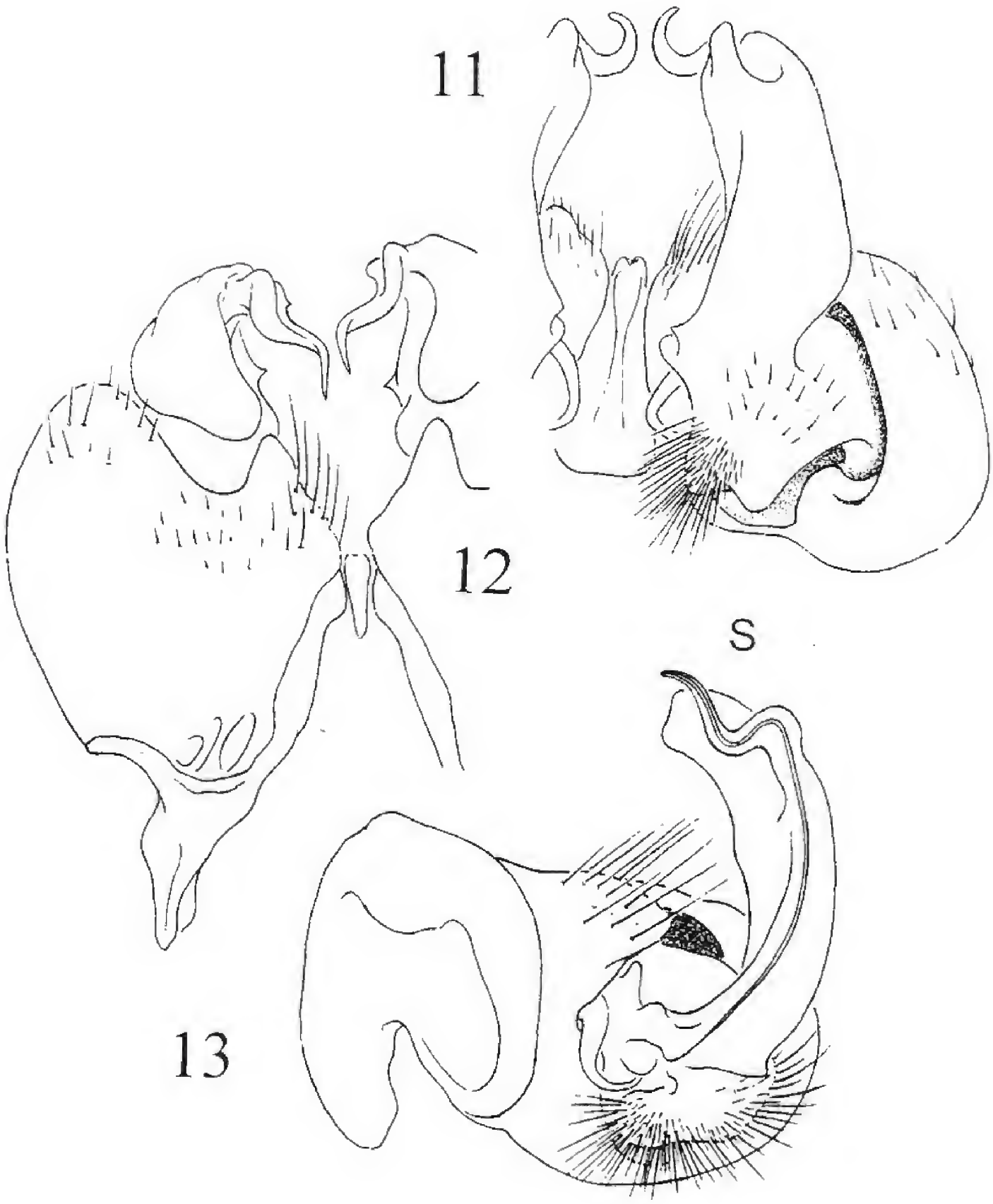
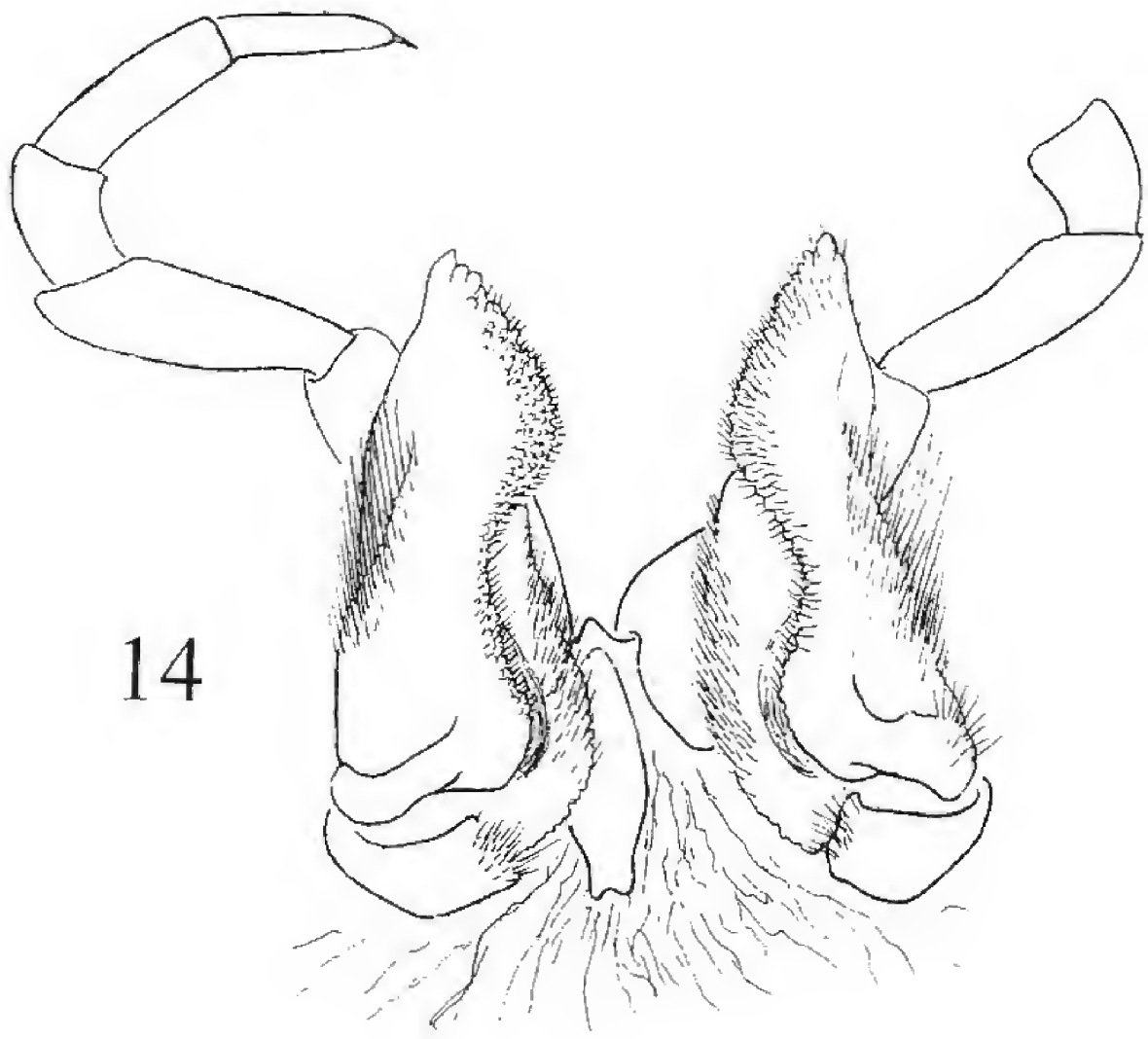
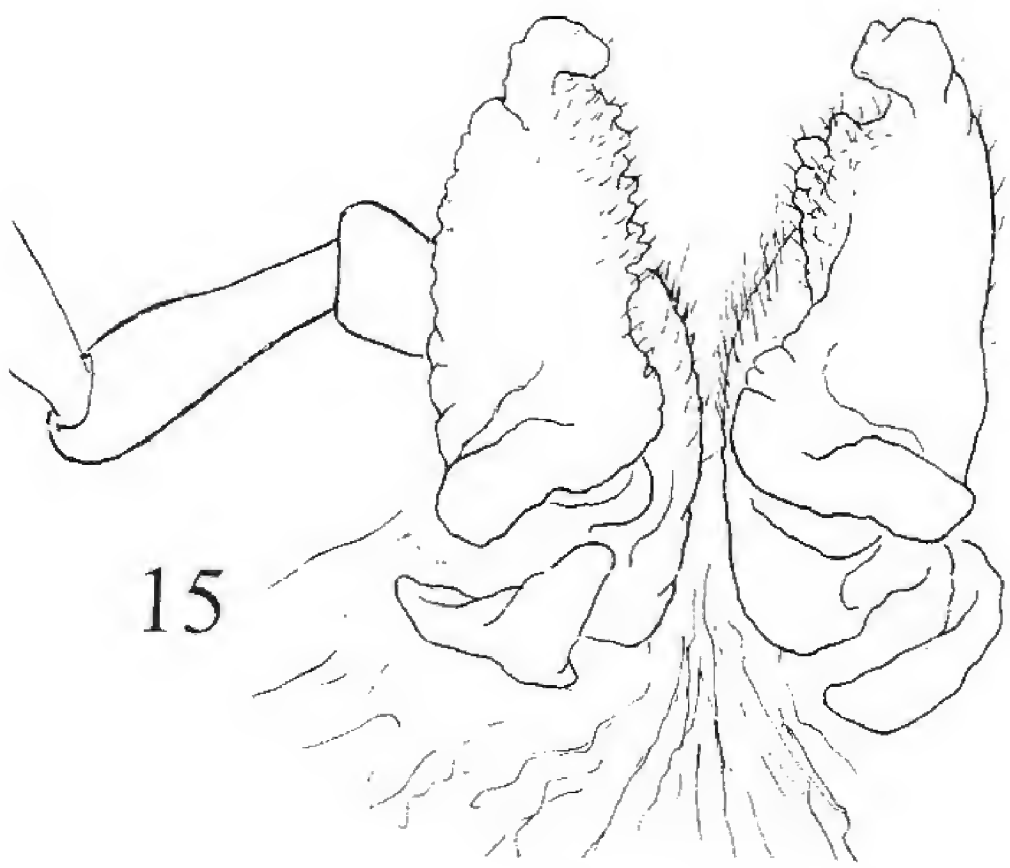
Figs. 7-10. *Pantanalodesmus marinezae*, new species. Left paranota of selected body segments. 7. Collum and segments 2 and 3. 8. Segment 5. 9. Segment 13. 10. Segment 13. Drawings from male topoparatype (VMNH).



Figs. 11-13. *Pantanalodesmus marinezae*, new species, male genitalia. 11. Gonopods in situ, ventral aspect (only part of right gonopod shown). 12. Gonopods, dorsal aspect (only part of right gonopod shown), showing reduction of sternum dorsally. 13. Left gonopod, mesal aspect. Drawings from male topoparatype (VMNH).





Figs. 14, 15. Female genitalia in telonychopodine species. 14. *Pantanalodesmus marinezae,* female topoparatype. 15. *Telonychopus klossae*, female paratype. Drawings in posterior (aboral) aspect, to same scale.